STUDIES ON THE WOLF SPIDERS (ARANEAE: LYCOSIDAE). I. A NEW GENUS AND SPECIES FROM KAZAKHSTAN, WITH COMMENTS ON THE LYCOSINAE

ALEXEY A. ZYUZIN

Zyuzin, A.A. 1993 11 11: Studies on the wolf spiders (Araneae: Lycosidae). I. A new genus and new species from Kazakhstan, with comments on the Lycosinae. *Memoirs of the Queensland Museum* 33(2): 693-700. Brisbane. ISSN 0079-8835.

A new genus *Oculicosa* (Araneae: Lycosidae: Lycosinae) is established and a new species *Oculicosa supermirabilis*, sp. nov. is described from South-western Kazakhstan. Relationships of the new species are analysed. The role of some morphological features of burrowing lycosids is specified. Tegular (median) apophysis in all members of the subfamily Lycosinae is declared to serve as the functional conductor of the embolus: the mechanism of its action is analysed. The role of some structures and the use of corresponding names is specified, the comparison of the main subfamilies is given. The structure of the tribe Trochosini Zyuzin, 1990 is revised: this tribe is divided into two subtribes including non-burrowing and burrowing forms.

On établit un genre nouveau *Oculicosa* (Araneae: Lycosidae: Lycosinae) et décrit une espèce nouvelle *Oculicosa supermirabilis* sp. n. du Sud-Ouest du Kazakhstan. Les affinités de l'espèce nouvelle sont analysées. On précise le rôle des quelques indices morphologiques des Lycosidés creusants. On a déterminé que l' apophyse tegulaire (median) chez tous les membres de la sous-famille Lycosinae sert de conducteur fonctionnel d'embolus: le mécanisme de sont action est analysé. On précise le rôle de quelques structures el l'usage des noms correspondants, la comparaison des principales sous-familles est donnée. On fait une révision de la structure de la tribu Trochosini Zyuzin, 1990: cette tribu se divise en deux sous-tribus insérant des formes non-creusantes et creusantes. □*Lycosidae, Oculicosa, conductor.*

Alexey A. Zyuzin, Institute of Zoology, Kazakhstan National Academy of Sciences, Akademgorodok, 480032 ALMA-ATA 32, Kazakhstan Republic; 18 March, 1993.

Burrowing spiders of the family Lycosidae within Kazakhstan are poorly known. Records exist only for *Allohogna singoriensis* (Laxmann, 1770), *Lycosa nordmanni* (Thorell, 1875) (= *L. narbonensis* auct., non Latreille, 1806), and *L. alticeps* (Kroneberg, 1875) (see Charitonov, 1932; Dubinin, 1946). However, of those, only the distribution in Kazakhstan of *A. singoriensis* has been well studied (see Marikovskij, 1956). The only large non-burrowing lycosid reported from Kazakhstan is *Hogna radiata* (Latreille) (see Schmidt, 1895: Aral Sea and Mangyshlak Plateau). That report is very doubtful, as the author studied juvenile specimens only.

MATERIAL AND METHODS

Spider material I collected in 1989 in Karynzharyk sands, South-western Kazakhstan, are used here. Specimens were captured at night with the use of a miner's head torch: spider's eyes reflect torch light at the distance of 20-25m and even more. Spiders were examined in 70% alcohol using binocular microscopes. To understand the relative position of different parts of the male and female genital apparatus during copulation, dissected tegular apophyses of males were attached to female epigynes (Fig. 5). Eye measurements are given in eyepiece micrometer units (x32). Genitalia and their parts for scanning electron microscopy were preserved in ethanol, air-dried, mounted on stubs, gold-coated and examined in a JEOL JSM-T200 at 15kv.

Abbreviations: ALE, anterior lateral eyes; AME, anterior median eyes; ARE, anterior row of eyes; AZ, private collection of the author; L, leg; LC, carapace length; P, palp; PLE, posterior lateral eyes; PME, posterior median eyes; TA, tegular apophysis; WC, carapace width; ZMMU, Zoological Museum of the Moscow University.

MORPHOLOGY AND DISCUSSION

Oculicosa gen. nov.

TYPE SPECIES

Oculicosa supermirabilis sp. nov.

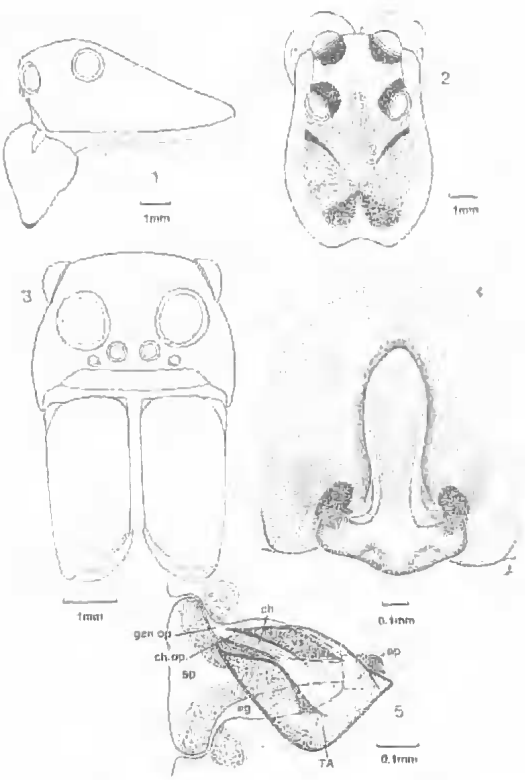
DIAGNOSIS

Medium size (body length 12-20mm). Cephalothorax: head strongly elevated, thorax in both sexes behind ALE is evidently descending

	PME	PLE	AME	ALE
PME	-	0.93-0.98	0.33-0.36	0.23-0.24
PLE	1.02-1.07	-	0.34-0.38	0.23-0.24
AME	2.80-3.00	2.67-2.93	-	0.63-0.71
ALE	4.20-4.42	4.10-4.30	1.40-1.58	-

TABLE 1. Relative size of eyes in *Oculicosa supermirabilis*, sp. nov. (2♂, 2♀)

towards abdomen (Fig. 1), lateral sides of head are almost vertical. Carapace is relatively narrow, ratio LC/WC is 1.44-1.50. PME and PLE are very large, height of ocular field is 0.39-0.42 of LC (Fig. 2). ARE recurved, AME larger than ALE (Fig. 3). Row 1 is 1.64-1.70 times shorter than row 2; row 3 is 1.19-1.23 times wider than row 2. Clypeus narrow, its height less than 1 diameter of AME. Retromargin of cheliceral fang furrow with 2 large equal teeth. Ti + Mt I and II with 2 ventral pairs of spines except apical ones. Base of embolus in lateroapical position, TA is transverse lamella with narrow stout process by its base, directed ventrad, and with sclerotized edge situated distally (Figs 6-8). TA on its inner (dorsal) side with deep narrow transverse sinuous channel opened at the distal end of sclerotized edge. Epigyne has narrow anterior part and widened posterior (genital) parts where transverse genital part of septum is situated (Fig. 4).



FIGS 1-4. *Oculicosa supermirabilis*, sp. nov.: 1, female carapace, lateral view. 2, ditto, dorsal view. 3, ditto, frontal view. 4, epigyne. 5, position of tegular apophysis on epigyne in *Alopecosa cuneata* (Clerck) during copulation. Abbreviations: ap, anterior pocket of epigyne; ch, channel of tegular apophysis; ch. op., channel opening; eg, epigynal groove; gen.op, genital opening of epigyne; gps, genital part of septum; sp, septal pedicle; vs, ventral spur('hook') of tegular apophysis evident through cuticle.

DISTRIBUTION

South-Western Kazakhstan.

Oculicosa supermirabilis sp. n.
(Figs 1-4, 6-8)

MATERIAL EXAMINED

TYPES. Holotype ♂, South-Western Kazakhstan, Mangistau Area, Yeraliev District, 37 km S of Akkuduk Vill., Karynzharyk sands (42°38'N, 54°03'E), clay soil, S.I. Ibraev and A.A. Zyuzin (ZMMU), 14-15 May 1989. Paratypes: 7 ♂, 3 ♀, same data; 1 ♂, 3 ♀, same data, except 15-16 May 1989 (1 ♀ paratype in ZMMU, remainder in AZ).

DESCRIPTION

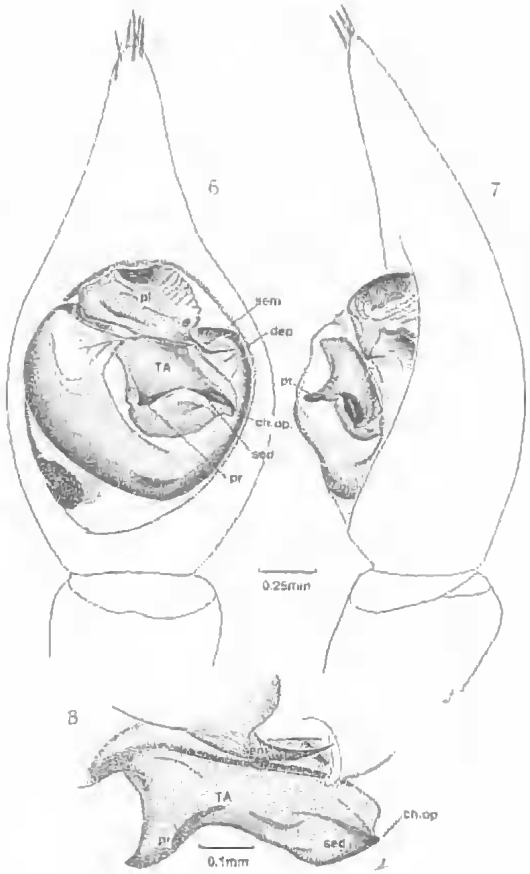
Female. Carapace brown or light brown. Lateral bands wide, continuous, forming wide light 'cheeks' at the sides of head. Median band represented by yellowish rhomboidal spot lying

Female (carapace length = 7.0mm)								Male (carapace length = 7.05 mm)						
Leg	Femur	Patella	Tibia	Met.	Tarsus	Total	T/CL	Femur	Patella	Tibia	Met.	Tarsus	Total	T/CL
1	5.20	2.40	3.70	3.40	1.80	16.50	2.36	6.20	2.70	5.15	5.50	2.50	22.05	3.13
2	5.00	2.15	3.35	3.35	1.80	15.65	2.24	6.10	2.60	4.80	5.60	2.60	21.70	3.08
3	4.60	2.00	3.20	4.00	1.80	15.60	2.23	6.00	2.35	4.60	6.70	2.70	22.35	3.17
4	5.80	2.30	4.30	5.70	2.25	20.35	2.91	7.30	2.50	5.80	8.50	3.25	27.35	3.88
P	2.70	1.50	1.60	-	2.00	7.80	1.12	3.20	1.50	1.60	-	2.10	8.40	1.19

TABLE 2. *Oculicosa supermirabilis*, sp. nov.: length of leg and palp segments in millimetres. T/CL, total leg length/ carapace length; met., metatarsus.

above median furrow (Fig. 2); sometimes this spot is triangular with its base near PLE. Ocular field yellowish-brown, with dark spots around eyes. Carapace evidently descending behind PLE and is supplied with dense fur-like whitish hairs at its edge. Legs: coxae covered dorsally with dense whitish long hairs. Remaining segments uniform yellowish; their length given in Table 2. Leg spination: femora I and II with 2 promesolateral spines; tibiae I and II with 2-2 ventral spines and 2 small apical ones, 1-1 mesolateral, no ectolateral spines; tibiae III and IV with 1-1 dorsal; metatarsi I and II with 2-2 ventral + 4 apical, 1-1 mesolateral, no ectolateral spines; tarsi I-IV dorsally with 2 submedian long setae. Palp: all segments uniform yellowish, but tarsus distally a little darker, tarsal claw long, slightly curved, with 4 very small teeth. Abdomen: sides with dispersed dark points, dorsal pattern consists of brownish lanceolate stripe with dark margins, series of light spots lying below, and whitish spots of different size around. This pattern is covered with dense whitish pubescence. Ventral side above epigastrum dark, with dense dark hairs and bristles, sparse dark hairs are also on spinnerets and at stigmal area, the remainder uniform whitish, but sometimes there are 2 closely situated, almost parallel longitudinal dark lines. Coxae ventrally yellowish-brown, sternum yellowish with some dark hairs on sides, labium and maxillae yellow-brown. Chelicerae reddish-brown, basal segment is covered with long dense whitish-grey hairs and bristles in front. Retromargin of cheliceral fang furrow with 2 teeth, promargin with 3. Body length 15.0-20.2 mm, LC 6.5-8.0 mm. Epigyne: Fig. 4.

Male. Body covered with white hairs. Pattern of both carapace and abdomen as in female, but carapace covered with many whitish-grey adpressed hairs. Ocular field with long and dense whitish hairs. Carapace edged with a narrow stripe of long dense fur-like whitish (silvery) hairs directed anteriad; many short, adpressed silvery hairs also at sides of head and form 'cheeks'. Legs: colouration as in female, coxae dorsally with long and dense silvery hairs. Length of legs as in Table 2. Leg spination: femora I and II as in female; tibiae I-IV with 1-1 dorsal spines, sometimes only prodorsal remains, laterally on each side 1-1, ventrally 2-2 + 2 apical; metatarsi I and II with 1-1 lateral on each side, ventrally 2-2 + 5 apical; tarsi I and II dorsally with 2 submedian long setae. Palp: segments yellow, cymbium distally brownish; all segments covered with white hairs: femur with sparse hairs, patella with many



FIGS 6-8. *Oculicosa supermirabilis*, sp. nov.: 6, male palpus, ventral view. 7, ditto, lateral view. 8, male tegular apophysis with synembolus, apical view. Abbreviations: ch. op., channel opening of tegular apophysis; dep, tegular depression; pl, palea; pr, stout process of tegular apophysis; sed, sclerotized edge of tegular apophysis; sem, synembolus.

short and adpressed hairs, tibia and cymbium (except its distal part) with long and dense hairs. Dentation of cheliceral furrow as in female. Body length 12.0-13.8 mm, LC 6.3-7.3 mm. Palpus: Figs 6, 7.

Ecology

All adults were collected in clayey parts of Karynzharyk sands.

Discussion

Oculicosa supermirabilis is closely related to some species of *Lycosa* s. lat., namely *Lycosa alticeps* (Kroneberg, 1875) and *L. medica* (Pocock, 1889), but differs from them by the

	Lycosinae	Evippinae	Pardosinae	Wadicosinae[1]	Venoninae[2]	Piratinae
1	a2-a3	a2	a2	a2	usually a1	a1-a2
2	b1; seldom b3 [3]	b1	b1	b1	b1-b2	b1; seldom b2 [4]
3	usually c1; seldom c2 & c3	c3	c3	c1	c1	c1; seldom c2 [5]
4	d1; seldom d3	d2	d2	d2	d2	d1-d3
5	e2	e3	e1	e2	e1	e3
6	f1	f1	f1-f2	f1	f1	f3
7	g1	g1	g1	g2	g1	g1
8	h1	h1	h1	h2	h2-h3	h1
9	i2; seldom i3	i3	i1	i4	?	i5
10	j1	j2 [6]; j6 and j2 [7]	j3	j4	j5	j6
11	k1; k5, usually k2; seldom k7 [3]	k2	k1, usually k2	k3	k4	k5-k6; seldom k4

CHARACTERS

1. Size: a1, small; a2, medium; a3, large-very large
2. Carapace, cephalic area: b1, high; b2, narrow; b3, protruding basally with anterior row of eyes
3. Carapace, posterior ocular trapezium: c1, trapezoidal; c2, wide trapezoidal; c3, +/-quadrangular
4. Carapace, size of anterior eyes: d1, variable; d2, small; d3, comparatively large
5. Male palp, origin of embolus: e1, mesolateral; e2, lateroapical; e3, distal (apical)
6. Male palp, shape of embolus: f1, long curved spine; f2, enlarged at tip; f3, short, combined with conductor
7. Male palp, tegulum: g1, no sclerotized processes; g2, with 1-2 stout well sclerotized processes
8. Male palp, tegular (median) apophysis: h1, thick, well sclerotized; h2, weakly sclerotized (membranous); h3, absent
9. Male palp, bed of tip of resting embolus: i1, small tegular depression; i2, enlarged tegular depression; i3, deep dorsal channel of TA; i4, tegular depression on upper tegular process; i5, deep ascending tegular groove
10. Male palp, character of conductor: j1, deep dorsal transverse channel of TA; j2, deep dorsal longitudinal channel of TA; j3, thick well-sclerotized basal part of palea concealed by tegulum; j4, opened (free) transverse sclerotized lateral process of the basal part of palea; j5, opened large apical; j6, combined with embolus (single complex)
11. Epigyne: k1, variable; k2, median inverted T-shaped plate; k3, entire plate with 2 parallel oblong grooves above; k4, simple entire plate; k5, simple hairy plate; k6, hairy plate with lateral sclerites; k7, posteriorly protruding hairy plate

TABLE 3. Comparison of lycosid subfamilies. Notes: [1] *Wadicosa*; [2] after Lehtinen & Hippa, 1979; [3] *Hippasa*; [4] *Aulonia*; [5] *Hygrolycosa*; [6] *Xerolycosa*; [7] *Evippa*.

shape of epigyne and tegular apophysis, by the profile of carapace (cf. Kroneberg, 1875, pl. IV, fig. 28; Pocock, 1889, pl. XIII, fig. 1), as well as by relatively larger PME and PLE, presence of only 2 teeth at the retromargin of chelicerae (in *L. alticeps* and *L. medica* 3), colouration of the ventral side of abdomen and smaller body length.

The descending carapace in both sexes of *Oculicosa supermirabilis*, fur-like hairs at the edges of carapace, and the long and dense whitish hairs on the dorsal side of coxae indicate a burrowing way of life (see also Zyuzin and Zarko, 1989; Zyuzin, 1990), although I could not find the burrows of this species. Our investigations showed that carapace pubescence together with dense hairs on the coxae considerably diminish the friction between the coxae and the edges of carapace; in the much more active males these features are more pronounced and supplemented with many dorsal adpressed whitish-grey hairs on the carapace thus facilitating their movements in burrows. The role of carapace descent is as follows. The comparatively long femora III and IV press against the carapace when moving in narrow burrows: the length of femur IV is slightly longer than the carapace slope. Long-legged males of burrowing lycosids very often have a low flattened carapace (as well as females of the genus *Lycosa* s. str., e.g. *Lycosa tarantula* and *L. nordmanni*: see Zyuzin, 1990): this compensates for the lack of descent, facilitates the folding of very long femora and improves the mobility of these spiders. I suggest that the strongly descending carapace not only in females but also in males (as in *Oculicosa*), together with comparatively narrow carapace, indicates the burrowing way of life from the early juvenile stages up to their imaginal moult: therefore, the distribution of such species is probably very restricted. On the contrary, in *Lycosa nordmanni* and *Allohogna singoriensis* with their flattened carapace in males, mature females seem to be more or less burrowing, while the juveniles, especially early stages, are active. This feature undoubtedly facilitates aerial dispersion of juveniles: as a result, both of these species are widely distributed.

PALPAL MORPHOLOGY

Further discussion concerns the terms 'conductor' and 'terminal apophysis', as their interpretation by different authors is sometimes rather contradictory.

Conductor

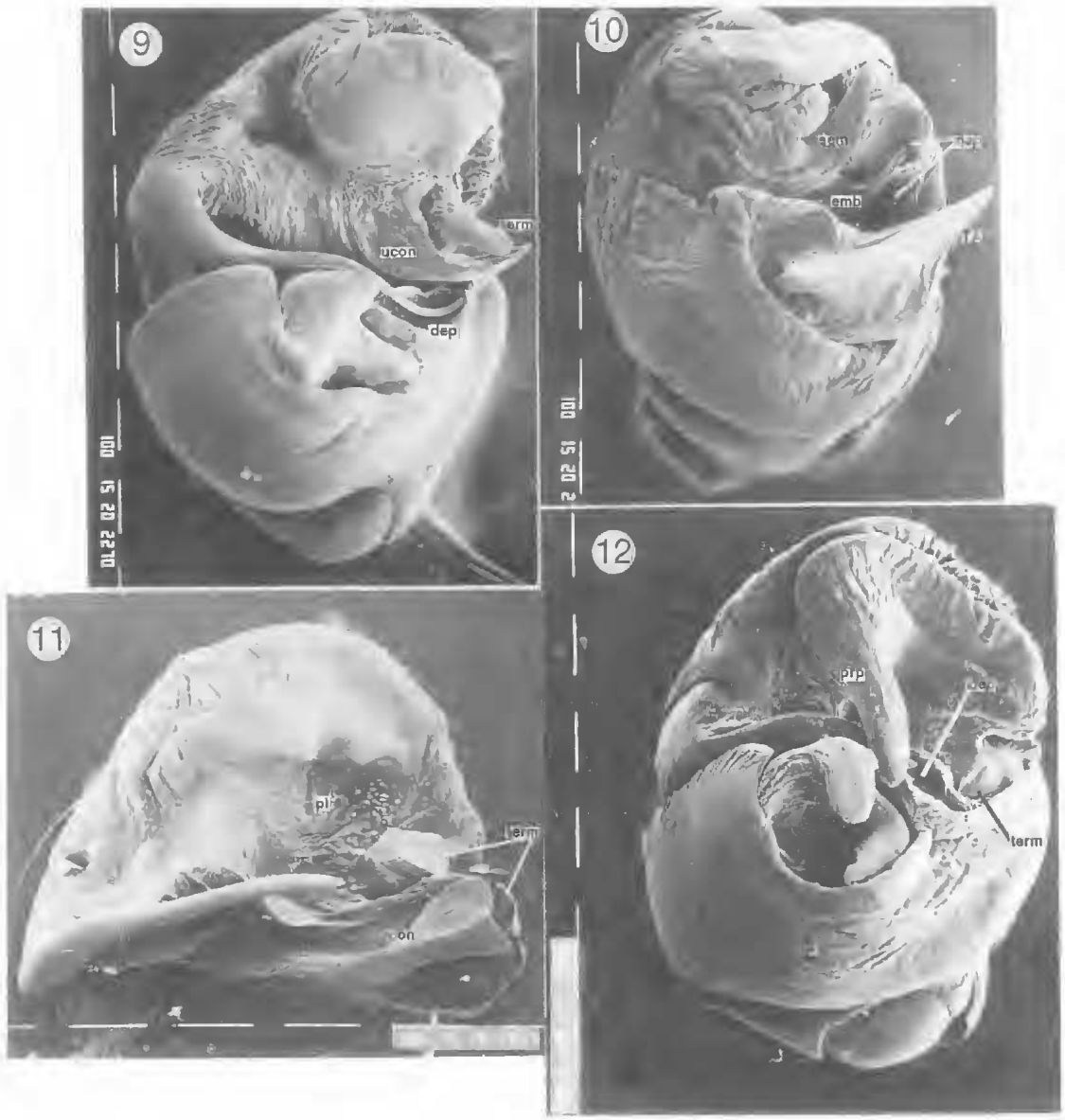
The tip of the resting embolus in both Pardosinae (at least in *Pardosa* and *Acantholycosa*) and Lycosinae lies in the oblong depression of the tegulum: in Pardosinae this depression is rather small and spoonlike (Figs 9, 12), while in Lycosinae it is enlarged, sometimes strongly, and usually forms the tegular lobe (Fig. 10; Dondale, 1986, figs 12, 13). In an unexpanded palp of Pardosinae the depression of the tegulum fully separates the embolus from the true (functional) conductor which is the transverse well-sclerotized groove situated near the base of the terminal part (shield, palea) of the genital bulb and almost fully concealed by the tegulum (Figs 9, 12). In members of Lycosinae, the enlarged depression of the tegulum is regarded as the conductor of the embolus (see Dondale and Redner, 1979; Dondale, 1986), though this bed for the resting embolus does not fit to assist the exact movement of the embolus tip to the female copulatory opening. Lehtinen and Hippa (1979) write: 'We are aware that "conductor" is not a very suitable name for the outer part of the Lycosid embolic division, because it is not always a functional conductor'. Our investigations have shown that the deep transverse channel on the inner (dorsal) surface of tegular apophysis opened at its narrow distal end and diagnostic for all members of the subfamily Lycosinae (Dondale, 1986) is intended for the embolus and undoubtedly directs its tip to the copulatory opening: thus, the TA of Lycosinae serves as the functional conductor. The mechanism of operation of such a conductor during copulation is shown in *Alopecosa cuneata* (Clerck) (Fig. 5): while the hooked ventral spur of the TA comes into contact (forms a hook-up) with the anterior pockets of the epigyne, the ventral rib of the 'hook' enters the longitudinal epigynal groove, so that the channel opening lying at the distal end of TA comes into proximity with the copulatory opening of the epigyne.

Above the embolus and behind the TA in many species of Lycosinae is situated a narrow, sharpened laminar process (see Figs 6-8) usually slightly grooved on its ventral side: the proposed name for this laminar process of palea in Lycosinae is 'synembolus', as it always accompanies the embolus and has the same direction. I suppose that the embolus during copulation enters the TA channel together with the laminar synembolus which directs the embolus to the channel and probably locks the last as a stopper, fully excluding the deviation of the embolus. Thus, the synembolus plays the role of auxiliary conductor. In species of the *Alopecosa pulverulenta* group the synembolus is fused with the base of the palea, so that only an ectal tooth remains at its external side: in this case all the base of the palea goes to the wide 'antechamber' before the channel.

Dondale (1986) correctly regards the subfamily name Hippasinae to be a junior synonym of the Lycosinae. In representatives of the genus *Hippasa* TA also serves as the functional conductor: despite the lack of an atrium in some *Hippasa* species (e.g. *Hippasa deserticola* Simon, and *H. cinerea* Simon) and the agelenid habit of the spiders, I regard them, as well as allied genera, to represent the tribe Hippasini Simon, stat. nov. in the subfamily Lycosinae (see Table 3).

Besides the Lycosinae, the conductor is represented by the tegular apophysis in two other subfamilies: Evippinae (type: *Evippa* Simon) and Allocosinae (type: *Allocosa* Banks).

1. Evippinae. Members of this subfamily have a hooked longitudinal TA which somewhat resembles the transverse trochosoid 'hook' of Lycosinae. As in the species of Lycosinae, the members of Evippinae have a distinct channel on the inner (dorsal) side of TA and a pedicled septum widened posteriad (Zyuzin, 1985, figs 15, 16, 20-22). But, despite these similarities, the genera *Evippa* and *Xerolycosa* have a number of features which allow them to be regarded as members of the separate subfamily. Thus, the channel on the dorsal side of TA in Evippinae is longitudinal (in all Lycosinae it is transverse); the whole embolus is situated in a deep depression and forms a very characteristic recurved flat loop; the base of embolus always has an apical position; the palea is strongly reduced; and the epigynal grooves are very shallow and lie at the level of the septal pedicle. Besides, in *Evippa* spp. the synembolus is transformed into a narrow functional conductor which is constantly situated in a channel of TA and projected beyond the TA limits: in this case TA serves as an auxiliary conductor. In *Xerolycosa* spp. the functional conductor is represented by TA: the embolus constantly lies in a channel (see Zyuzin, 1985); the



FIGS 9-12. Scanning electron micrographs: 9, 10, 12, genital bulbs dissected from cymbia; 11, palea with embolus and conductor dissected from genital bulb). 9, *Pardosa sodalis* Holm. 10, *Hogna radiata* (Latreille). 11, *Pardosa chionophila* L. Koch. 12, *Pardosa turkestanica* (Roewer). Abbreviations: con, conductor; dep, tegular depression; emb, embolus; pl, palea; prp, process of palea; sem, synembolus; TA, tegular apophysis; term, terminal apophysis; ucon, upper branch of conductor. Scale bar=0.1 mm.

synembolus is strongly reduced and fused with the semi-transparent extension of the embolus.

2. Allocosinae. In *Allocosa* spp. TA is double-branched, the channel is situated on the dorsal side of the narrow basal branch and holds the tip of the resting embolus; and the atrium of the epigyne is lost (see Dondale and Redner, 1983; Dondale, 1986). Besides, the basal part of the pardosoid palea probably serves as an auxiliary conductor directing the embolus into the channel of TA in the expanded palpus.

In the genus *Pirata* and allied genera (*Piratula, Aulonia, Hygrolycosa*) the functional conductor is combined with a short thin embolus in a com-

mon sickle-shaped complex resting in a deep and narrow ascending tegular groove. The distal position of the well sclerotized conductor in representatives of the subfamily Venoniinae (*Venonia* and allied genera: see Lehtinen and Hippa, 1979) does not allow us to include *Pirata* in the subfamily Venoniinae, as Dondale (1986) did. *Pirata* and allied genera probably deserve to be included in the separate subfamily Piratinae (type: *Pirata* Sundevall, 1832) (see Table 3).

Terminal Apophysis

Very often the palea in Pardosinae (at least in *Pardosa* and *Acantholycosa*) above the embolic division is supplied with a stout, very sclerotized process: many authors (e.g. Holm, 1947; Tongiorgi, 1966; Kronestedt, 1975) designate this process as the terminal apophysis. Dondale (1986) writes '... the terminal apophysis ... is believed to assist the finding and penetration of the copulatory opening by the embolus tip'. It is therefore obvious that, to play this very important role, the terminal apophysis must be situated immediately above the end of the conductor (Figs 9, 11; Kronestedt, 1975, fig. 3); sometimes the dentiform terminal apophysis is situated directly at the outer part of the conductor (see Dondale and Redner, 1984, figs 21, 25, 26). At the same time, there are many cases when the much larger paleal process is situated far above the conductor, i.e. so that it cannot assist the exact penetration of the embolus tip into the female copulatory opening (Fig. 12); however, such a process is also wrongly designated as the terminal apophysis (see Lowrie and Dondale, 1981, fig. 10; Dondale and Redner, 1984, fig. 5; Dondale, 1986, fig. 7). Tongiorgi (1966, fig. 1) correctly designates the true terminal apophysis and the laminar process: the destination of such a process is otherwise, e.g. to protect the resting embolus, or to make an engagement during copulation.

An incorrect designation of terminal apophysis is also used by Buchar (1976, figs 7, 8): in his fig. 8 it is a mere tubercle of the palea, while in fig. 7 (*Pardosa thaleri*) this author confuses it with the narrow laminar conductor sharpened at the tip and characteristic for the *Pardosa bifasciata* group. The similar conductor shape, also designated as the terminal apophysis, is in the species '*Pardosa*' *oncka* Lawrence (see Kronestedt, 1987, fig. 4C).

In some works the synembolus of Lycosinae is also called the terminal apophysis (see Dondale and Redner, 1979, 1990; Dondale, 1986). But, as the synembolus only directs the embolus to the channel of TA (see above), the role of the true terminal apophysis is fulfilled by the ventral process(es) of TA fixing the last on the female epigyne. The designation of the ectal tooth of palea in the *Alopecosa pulverulenta* group as the terminal apophysis (see Kronestedt, 1990) is also incorrect: actually this tooth is the synembolus (see above).

Formerly (see Zyuzin, 1990), I restricted the Lycosini to burrowing lycosids only, and erected the new tribe Trochosini for non-burrowing genera of Lycosinae. Herein the structure of both these tribes is revised: thus, I include in Trochosini only those genera that are characterized by the very peculiar TA which has a transverse lamella with a ventrally directed trochosoid 'hook', or spur, and the epigynal septum with a distinct narrow pedicle, widened posteriad, very often in the shape of an inverted 'T'; epigynal grooves on either side of septal pedicle are rather deep and distinct. Both non-burrowing and burrowing lycosids are included in this very large tribe, undoubtedly having a common origin; in accordance with this view the tribe Trochosini is divided into two subtribes: Trochosina Zyuzin, stat. nov. (including the non-burrowing genera *Trochosa*, *Alopecosa* s. str., *Hogna* s. str., *Schizocosa*), and Geolycosina, subtrib. nov. (including the burrowing genera *Arctosa* s. str., *Geolycosa*, *Allohogna* with a very characteristic carapace profiles: see Zyuzin, 1990, fig. 1). There are many species throughout the world, including African ones, which also belong to the Trochosini: the generic and subtribal position of these remain obscure due to the artificial system of Roewer (1959-1960).

As shown in Fig. 5, the length of the epigynal groove and septal pedicle in species of Trochosini is correlated with the length of the ventral spur of TA.

As to the tribe Lycosini, I place here only the members of *Lycosa* s. str. with their very peculiar genitalia, and some allied species referred to *'Allocosa'*, *'Hogna'* and probably *Metatrochosina* (Roewer, 1959-1960, figs 124, 126, 129, 219, 304-305, 517).

ACKNOWLEDGEMENTS

For the loan of material and necessary technical assistance I am very grateful to the following persons: Dr Ch. Deeleman-Reinhold (Ossendrecht, The Netherlands); Dr C.D. Dondale (Ottawa, Canada); Mr S.I. Ibraev (Alma-Ata, Kazakhstan); Drs D.V. Logunov (Novosibirsk),

Y.M. Marusik (Magadan) and K.G. Mikhailov (Moscow) (all Russia). For the kindly given possibility of use the scanning electron microscope in my work I am very thankful to Dr V.K. Lebsky and Mr V.M. Semyonov (St. Petersburg, Russia). I am also indebted to Mr K.N. Plakhov (Alma-Ata), who organized the scientific trip to Mangyshlak and Ustyurt Plateaus.

LITERATURE CITED

BUCHAR, J. 1976. Über einige Lycosiden (Araneae) aus Nepal. Khumbu Himal 5: 201-227.

CHARITONOV, D.E. 1932. Katalog der Russischen Spinnen. Beilage zum Annuaire du Musée Zoologique, Leningrad, 32. 206pp.

DONDALE, C.D. 1986. The subfamilies of wolf spiders (Araneae: Lycosidae). Actas del X Congreso Aracnológico, Jaca, España, vol. 1: 327-332.

DONDALE, C.D & REDNER, J.H. 1979. Revision of the wolf spider genus *Alopecosa* Simon in North America (Araneae: Lycosidae). Canadian Entomologist 111: 1033-1055.

1983. The wolf spider genus *Alloçosa* in North and Central America (Araneae, Lycosidae). Canadian Entomologist 115: 933-964.

1984. Revision of the *milvina* group of the wolf spider genus *Pardosa* (Araneae: Lycosidae). Psyche 91: 67-117.

1990. The wolf spiders, nurseryweb spiders, and lynx spiders of Canada and Alaska (Araneae: Lycosidae, Pisauridae, and Oxyopidae). The Insects and Arachnids of Canada 17. 383 pp. (Agriculture Canada: Ottawa).

DUBININ, V.B. 1946. [Inhabitants of mammal holes in South-Khazakhstan Area and their significance for man]. Izvestija Akademii Nauk Kazakhskoj S.S.R., Parasitological Series 4: 93-102. [in Russian]

HOLM, Å. 1947. Egentliga Spindlar. Araneae. Fam. 8-10, Oxyopidae, Lycosidae och Pisauridae. Svensk Spindelfauna vol. 3, 48 pp.

KRONEBERG, A. 1875. Araneae. In: Fedtschenko, A.P. Reise in Turkestan, Zoologischer Theil 2: 1-58.

KRONESTEDT, T. 1975. Studies on species of Holarctic *Pardosa* groups (Araneae, Lycosidae). I. Redescription of *Pardosa albomaculata* Emerton and description of two new species from North America, with comments on some taxonomic characters. Zoologica Scripta 4: 217-228.

1987. On some African and Oriental wolf spiders (Araneae, Lycosidae): redescription of *Pardosa oncka* Lawrence from Africa, with notes on its generic position. Journal of Natural History 21: 967-976.

1990. Separation of two species standing as *Alopecosa oculeata* (Clerck) by morphological, behavioural and ecological characters, with remarks on related species in the *pulverulenta* group (Araneae, Lycosidae). Zoologica Scripta 19: 203-225.

LEHTINEN, P.T. & HIPPA, H. 1979. Spiders of the Oriental-Australian region. I. Lycosidae: Venoniinae and Zoicinae. Annales Zoologici Fennici 16: 1-22.

LOWRIE, D.C. & DONDALE, C.D. 1981. A revision of the *nigra* group of the genus *Pardosa* in North America (Araneae, Lycosidae). Bulletin of the American Museum of Natural History 170: 125-139.

MARIKOVSKIJ, P.I. 1956. [Tarantula and karakurt. Morphology, biology, toxicity]. (Academy of Sciences of Kirghiz S.S.R.: Frunze). 281 pp. [in Russian]

POCOCK, R.I. 1889. Arachnida, Chilopoda and Crustacea. In: Aitchison, J.E.T. The Zoology of the Afghan Delimitation Commission. Transactions of the Linnean Society of London (2) 5, Zoology: 110-121.

ROEWER, C.F. 1959-1960. Araneae Lycosaeformia II (Lycosidae). Exploration du Parc National de l' Upemba. Mission G.F. De Witte, fascicule 55. Institut des Parcs Nationaux du Congo Belge. 1040 pp. (Bruxelles).

SCHMIDT, P. 1895. Beitrag zur Kenntniss der Laufspinnen (Araneae Citigradae Thor.) Russlands. Zoologische Jahrbücher, Abteilung für Systematik 8: 439-484.

TONGIORGI, P. 1966. Italian wolf spiders of the genus *Pardosa* (Araneae: Lycosidae). Bulletin of the Museum of Comparative Zoology 134: 275-334.

ZYUZIN, A.A. 1985. [Generic and subfamilial criteria in the systematics of the spiders family Lycosidae (Aranei), with the description of a new genus and two new subfamilies]. Proceedings of the Zoological Institute, Leningrad 139: 40-51. [in Russian]

1990. Studies on burrowing spiders of the family Lycosidae (Araneae). I. Preliminary data on structural and functional features. Acta Zoologica Fennica 190: 419-422.

ZYUZIN, A.A. & ZARKO, M.V. 1989. The structural and functinnal features of digging spiders of the family Lycosidae (Araneae). In: XI International Congress of Arachnology, Turku, Finland, 7-12 August, 1989. Abstracts. Reports from the Department of Biology, University of Turku 19: 116.